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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA, SUITE 1600
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
VUONG, QUOCHIEN B	
ART UNIT	**PAPER NUMBER**
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/707,744	SUGAR ET AL.	
	Examiner	Art Unit	
	Quochien B. Vuong	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/02/2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 23-27* is/are rejected.

7)☒ Claim(s) *11-22, 28 and 29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to applicant's response filed on 11/02/2007. Claims 1-29 are now pending in the present application. This action is made non-final.

Terminal Disclaimer

1. The terminal disclaimer filed on 10/02/2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,728,517 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7, 9, and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. (US 7,006,848) in view of Matero (US 6,215,988).

Regarding claim 1, Ling et al. (figure 1; column 3, line 23 – column 6, line 24) disclose a multiple-input multiple-output (MIMO) radio transceiver on a single semiconductor integrated circuit (column 35, line 63 – column 36, line 3), comprising: a receiver comprising at least first and second receiver circuits each to process a signal

from a corresponding one of first and second antennas, the first receiver circuit downconverts a first receive signal detected by the first antenna to produce a first baseband signal, the second receiver circuit downconverts a second receive signal detected by the second antenna to produce a second baseband signal (column 13, line 57 – column 14, line 7); and a transmitter comprising at least first and second transmitter circuits, the first transmitter circuit upconverts a first baseband transmit signal to generate a first radio frequency signal that is coupled to the first antenna for transmission, the second transmitter circuit upconverts a second baseband transmit signal to generate a second radio frequency signal that is coupled to the second antenna for transmission (figure 3; column 10, line 3 – column 11, line 33) (it is noted that the system 100 in figure 1 show the communication between first system 110 as a transmitter and a second system 150 as a receiver; however, both first and second systems are transceiver systems which can transmit and receive, for example the first system 110 has transmitter section including 112, 114, 120, and MOD 122a-122t, and receiver section including DEMOD 122a-122t and 132). Ling et al. do not specifically disclose a first power amplifier that amplifiers the first radio frequency signal; and a second power amplifier that amplifies the second radio frequency signal, wherein the power amplifiers are internal or external to the single semiconductor integrated circuit. However, Matero (figure 3) disclose a first power amplifier (66) that amplifiers the first radio frequency signal; and a second power amplifier (84) that amplifies the second radio frequency signal, wherein the power amplifiers are internal to the circuitry (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having

ordinary skill in the art at the time the invention was made to adapt the power amplifiers of Matero to the transceiver of Ling et al. for amplifying the signal before transmitting.

Regarding claim 2, Ling et al. and Matero disclose the radio transceiver of claim 1 above; in addition, Matero (figure 3) disclose a local oscillator (52) coupled to the receiver and to the transmitter, the local oscillator supplying a local oscillator signal to each of the first and second receiver circuits used for downconverting the first and second receive signals, respectively, and supplying a local oscillator signal to each of the first and second transmitter circuits used for upconverting the first and second baseband transmit signals, respectively, to a desired frequency for the first and second radio frequency signals, respectively (column 4, lines 27 – 60).

As to claim 3, Matero discloses wherein the first receiver circuit and the second receiver circuit process the first and second receive signals substantially simultaneously to allow for combining of signals resulting from processing by the first and second receiver circuits (column 4, lines 27 – 60).

As to claim 4, Matero discloses wherein the first transmitter circuit and the second transmitter circuit process the first and second baseband transmit signals for transmission of the corresponding first and second radio frequency signals substantially simultaneously (column 4, lines 27 – 60).

As to claim 5, Matero (figure 3) discloses a frequency synthesizer that produces a local oscillator signal that is coupled to each of the first and second receiver circuits to be mixed with the first and second receive signals, respectively, wherein the local oscillator signal may be at any frequency within one or more discrete radio frequency

bands to receive the first and second receive signals at a common frequency, and wherein the frequency synthesizer generates a local oscillator signal that is coupled to the first and second transmitters to upmix the first and second baseband transmit signals, respectively, for transmission of the corresponding first and second radio frequency signals at a common frequency within the one or more radio frequency bands (column 4, lines 27 – 60).

As to claims 6 and 7, Ling et al. disclose wherein the first and second receiver circuits comprise a single stage mixing process to downconvert the first and second receive signals directly to baseband or a two stage mixing process to downconvert the first and second receive signals to first and second intermediate frequency signals at a common intermediate frequency, and then to first and second baseband signals (column 13, line 57 – column 14, line 7).

As to claim 9, Matero (figure 3) disclose a first power amplifier (66) in the first transmitter circuit that amplifies the first radio frequency signal and a second power amplifier (84) in the second transmitter circuit that amplifies the second radio frequency signal (column 4, lines 27 – 60).

As to claim 23, Ling et al. and Matero disclose the MIMO transceiver of claim 1 above; in addition, Ling et al. disclose a system comprising a plurality of MIMO radio transceivers (transceivers 122a-122t), and further comprising a baseband signal processor (TX and RX processor) coupled to the plurality of MIMO radio transceivers (figure 1; column 13, line 57 – column 14, line 7).

As to claim 24, Ling et al. disclose wherein the baseband signal processor supplies the first and second baseband transmit signals to a first MIMO radio transceiver and supplies third and fourth baseband transmit signals to a second MIMO radio transceiver, and wherein the baseband signal processor processes the first and second baseband signals produced by the first MIMO radio transceiver and processes the third and fourth baseband signals produced by the second MIMO radio transceiver (figure 1; column 13, line 57 – column 14, line 7).

As to claim 25, Ling et al. disclose wherein the receivers of the second MIMO radio transceivers simultaneously receive signals detected at respective antennas coupled thereto to produce the first, second, third and fourth baseband signals, and wherein the transmitters of the first and second MIMO radio transceivers simultaneously process the first, second, third and fourth baseband transmit signals for simultaneous transmission of corresponding radio frequency signals by respective antennas coupled thereto (figure 1; column 13, line 57 – column 14, line 7).

Regarding claim 26, Ling et al. disclose method for radio communication comprising steps of: coupling first and second radio frequency signals detected by first and second antennas to first and second receiver circuits on an integrated circuit; downconverting the first and second radio signals with the first and second receiver circuits to produce first and second baseband signals; coupling first and second baseband first and second transmitter circuits, integrated circuit; upconverting the first and second signals with the first and produce first and second transmit signals to respectively, on the baseband transmit second transmitter circuits to transmit radio

frequency signals at a common center frequency; and coupling the first and second transmit radio frequency signals to the first and second antennas, respectively, for simultaneous transmission. Ling et al. do not disclose from downconverting and upconverting from a common center frequency and amplifying the first radio frequency signal using a first power amplifier; and amplifying the second radio frequency signal using a second power amplifier, wherein the power amplifiers are internal or external to the single semiconductor integrated circuit. However, Matero (figure 3) disclose the first and second receivers downconverting and the first and second transmitters upconverting from a common center frequency (column 4, lines 27 – 60, the same local oscillator signal going to mixers 60, 74, and 78); and amplifying the first radio frequency signal using a first power amplifier; and amplifying the second radio frequency signal using a second power amplifier, wherein the power amplifiers are internal or external to the single semiconductor integrated circuit (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the teaching of Matero to the transceiver of Ling et al. for compact design since using only a single local oscillator signal and amplifying the signal before transmitting.

Regarding claim 27, Ling et al. (figure 1; column 3, line 23 – column 6, line 24) disclose a radio transmitter integrated on a single semiconductor integrated circuit, comprising at least first and second transmitter circuits that upconvert first and second baseband signals, respectively, for transmission substantially simultaneously. Ling et al. do not specifically disclose wherein the first transmitter circuit comprises a first power

amplifier; and wherein the second transmitter circuit comprises a second power amplifier, and wherein an output power of the first power amplifier and an output power of the second power amplifier are reduced. However, Matero (figure 3) disclose a first transmitter circuit comprises a first power amplifier (66); and wherein a second transmitter circuit comprises a second power amplifier (84), and wherein an output power of the first power amplifier and an output power of the second power amplifier are reduced (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the power amplifiers of Matero to the transceiver of Ling et al. for amplifying the signal before transmitting.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Hasler et al. (US 5,606,736).

Regarding claim 8, Ling et al. and Matero disclose the radio transceiver of claim 7 above. Ling et al. and Matero do not specifically disclose a frequency synthesizer that supplies a radio frequency local oscillator signal and an intermediate frequency local oscillator signal to the first and second receiver circuits, wherein the intermediate frequency local oscillator signal is derived from the radio frequency local oscillator signal by a division ratio. However, Hasler et al. (figures 1 and 2) disclose a frequency synthesizer that supplies a radio frequency local oscillator signal and an intermediate frequency local oscillator signal to the first and second receiver circuits, wherein the intermediate frequency local oscillator signal is derived from the radio frequency local

oscillator signal by a division ratio (column 2, line 58 – column 3, line 15). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the frequency synthesizer of Hasler et al. to the transceiver of Ling et al. and Matero for compact design since using only a single frequency synthesizer.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Yamaguchi et al. (US 5,966,666).

Regarding claim 10, Ling et al. and Matero disclose the radio transceiver of claim 1 above. Ling et al. and Matero do not specifically disclose wherein each of the first and second receiver circuits comprises a radio frequency mixer that down-mixes the first and second receive signals, respectively, to an intermediate frequency signal, and a pair of quad mixers that down-mix the intermediate frequency signal to in-phase and quadrature baseband signals. However, Yamaguchi et al. (figure 1) disclose each of the first and second receiver circuits comprises a radio frequency mixer (21, 22) that down-mixes the first and second receive signals, respectively, to an intermediate frequency signal, and a pair of quad mixers (27) that down-mix the intermediate frequency signal to in-phase and quadrature baseband signals (column 2, line 54 – column 3, line 50). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the mixers of Yamaguchi to the transceiver of Ling et al. and Matero for processing the received signals.

Allowable Subject Matter

6. Claims 11-22, 28 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments with respect to claims 1-10 and 23-27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quochien B. Vuong whose telephone number is (571) 272-7902. The examiner can normally be reached on M-F 9:30-18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung can be reached on (571) 272-7882. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QUOCHIEN B. VUONG
PRIMARY EXAMINER

Quochien B. Vuong
Jan. 05, 2008.